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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/677,781	10/02/2000	Katsuhide Manabe	PM273686	4206

909 7590 10/15/2002
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EXAMINER

MULPURI, SAVITRI

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 10/15/2002

13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/677,781

Applicant(s)

Manabe et al

Examiner

Savitri Mulpuri

Art Unit

2812



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on May 20, 2002
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 53-110 and 113-118 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 53-110 and 113-118 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 10 6) ☐ Other: _____

Art Unit:

DETAILED ACTION

This action is in response to the applicant's response filed on 7/12/02 and with IDS filed on 5/23/02.

Claim Rejections - 35 USC § 112

Claims 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 114, 116, 118 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support for the range of claimed limitation silane to ammonia ratio of 6×10^{-10} to 2.6×10^{-8} .

Claims rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 53-110, 113-118 are not clear whether the applicant intend to claim silane to TMG rate or ratio. If it is rate there should be units next numerical value.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 53-110-113-118 are rejected under 35 U.S.C. 103(a) as being unpatentable over sayyah in combination with Koide et al.

Sayyah et al discloses a method growing epitaxial layers GaN and AlGa_N layers by the following process steps: Providing a sapphire substrate; growing a aluminum gallium nitride compound layer or gallium nitride layer and intentionally doping Si to form n-type dopant layer with concentration approximately at $1-5 \times 10^{19}/\text{cm}^3$. However, since Sayyah teaches the concentration of the n-type dopants is with the limit as of the claimed concentration, inherently the conductivity in the ^{Sayyah} Khan et al must be with in the claimed range from 3.4 /ohm-cm to 130 /ohm cm. Sayyah et al discloses the ratio of silane to TMG, where silane is 2.4×10^{-6} mole fraction and 5×10^{-5} mole fraction and disclose the silane to ammonia.

Sayyah does not disclose growing GaN by providing TMG at a temperature in the range of -15 to -12.5 C.

Koide et al discloses growing GaN by TMG a at a temperature in the range of -15 to -12.5 C (see left col. 1, lines 1-5). It would have been obvious to one of ordinary skill in the art to grow GaN or AlGa_N at low temperature in the invention of Sayyah because Koide process is to reduce parasitic reaction between metal organic compounds with ammonia thereby producing AlGa_N layers with controlled composition (see abstract) .

Art Unit:

Response to the arguments: Claim 53-110, 113-118 are recites the limitation "supplying ratio" in 53-56. There is insufficient antecedent basis for this limitation in the claim.

Response to the applicant arguments: Applicant show the support to the claimed range of silane to ammonia. in both 54, 56 in page 28, lines 2-14. However, the recited range can not be calculated from the pointed disclosure. Applicant must provide step by step calculation to show such range from the information provided anywhere in the disclosure. Kodie use low temperature growth similar to instantly claimed growth temperature to reduce parasitic reaction between metal organic compounds with ammonia thereby producing AlGaN layers with controlled composition (see abstract) .

Applicant argues that silicon is not n-type dopant. However, Sayyah teaches intentionally doping of Si , wherein Si is shallow donor in nitride based compound semiconductors. Remarks made by applicant over Khan and Pankove is no longer valid because Khan reference is deleted from the action.

Applicant's arguments with respect to claims 53-110, 113-116 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

Art Unit:

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Mulpuri whose telephone number is (703) 305-5184. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


SAVITRI MULPURI
PRIMARY EXAMINER